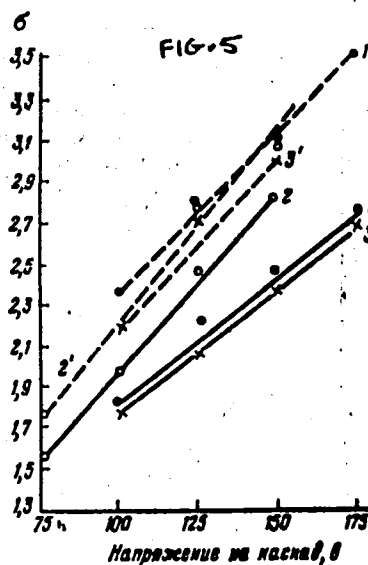
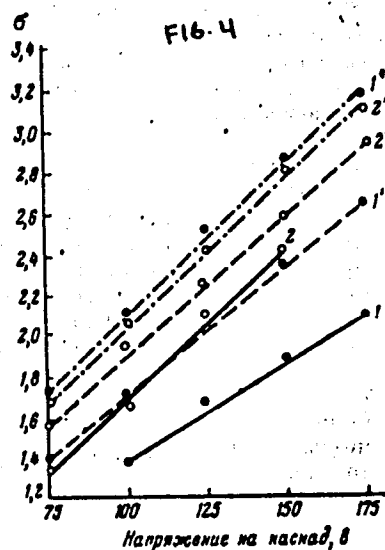


20426
S/109/60/005/012/024/035
E192/E582

Simultaneous Activation of Various Photocathodes and Emitters in
Photo-electron Multipliers



Card 6/6

L 43085-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pab-10/Pt-7 IJP(c) GS
 ACCESSION NR: AP5007915 S/0000/64/000/000/0086/0089

AUTHOR: Vladimirovskiy, V. V.; Koshkarev, D. G.; Tarasov, Ye. K.

TITLE: 500-Gev proton accelerator

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963.
 Trudy. Moscow, Atomizdat, 1964, 86-89

TOPIC TAGS: high energy accelerator, injector, synchrotron

ABSTRACT: The present report discusses a third alternative of an injector ring, whose advantage would be the fact that such an accelerator-injector has already been built at Serpukhov; namely, the 70-Gev accelerator of the Institute of Theoretical and Experimental Physics, which has a ring just seven times smaller in length than that of the main accelerator. The 70-Gev accelerator can operate both as an independent device producing a proton beam with an energy of 70 Gev and also as an injector with an energy of 15 Gev per cycle. Provision would be made for the use of multi-turn injection on the Serpukhov accelerator to increase the intensity. (The first alternative was an auxiliary proton synchrotron with an energy of 15 Gev, proposed in 1959 by Sandsom. The second alternative was a long injector which

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ACCESSION NR: AP5007915

6

has a ring equal in length to the main accelerator and is placed in the same ring chamber.) The report presents the main parameters of the 500-Gev accelerator and the arrangement of its magnets and the correcting elements. Serpukhov possesses, it is noted, enough space for an accelerator even larger than the 70-Gev, which would become its injector. The comparatively long acceleration time of 6 seconds in the parameter list is due to the properties of the injector, in which the energy distribution of the accelerated particles is rather large. Acceleration time would decrease at higher radio-frequencies. "The authors take this opportunity to express their thanks to F. A. Vodop'yanov (RAI AN SSSR) for his very valuable ideas in the field of high-frequency accelerating systems, to L. L. Gol'din for his active participation in the selection of the parameters of the preliminary alternative of the accelerator, and to the computer specialists O. N. Vasil'yeva, T. K. Stadnikova, and N. I. Cherepova for carrying out the large quantity of numerical computations." Orig. has 2 figures, 1 table.

ASSOCIATION: Institut teoreticheskoy i eksperimental'noy fiziki GKAE SSSR
(Institute of Theoretical and Experimental Physics, GKAE SSSR)

Card 2/3

SUBMITTED: 26 MAY 68

TARASOVA, Ye.M. [deceased]; TULUPOV, V.A.

Reduction of acetylcyclohexane by the Kishner reaction. Zhur.ob.
khim. 31 no.6:1936-1941 Je '61. (MIRA 14:6)

1. Moskovskiy gosudarstvennyy universitet i Vsesoyuznyy zaochnyy
mashinostroitel'nyy institut.
(Cyclohexane)

TARASOVA, Ye. M.

Colloids

Kinetics of the thixotropic formation of the structure of suspensions of Oglanlinskiy bentonite. Dzhardanakskiy clay and mixtures of the two. Izv. Turk. fil. AN S.S.R. No. 1, 1951.

9. Monthly List of Russian Accessions, Library of Congress, June 1953, Uncl.

TARASOVA, YE. M.

TARASOVA, YE. M., and MURAV'YEVA, M. YA.

"Composition and Properties of Clays and Argillaceous Soils (Loams)
From Certain Deposits in Western Turkmenistan", Izv. AN Turkmen SSR, No 1,
73-80, 1954.

The authors investigate six assays of clays which are now being
utilized in the production of brick in the region of Tashauz and
Kazandzhik (Nebit-Dag). The most important properties are presented
in a table. All the clays are strongly salted, especially the Nebit-
Dag clays; during firing, however, the salting quality decreases in
consequence of the sublimation of the salts. (RZhGeol, No 5, 1954).
SO: Sum. No. 443, 5 Apr. 55

TARASOVA, Ye. M., and Murav'yeva, M. Ya.

"The influence of Salts on the Water Resistance of Clays and Loams of Turkmenistan"

Izv. AN TurkSSR No 3, 1954, 58-62

The authors present results of experiments, conducted with natural clays and loams, which established that the addition of soluble sulfates, chlorides, and their mixtures lowers the water resistance of brick clay 30-60%. The water resistance of brick clay can be increased 200-300% by adding hydrophobic substances. (RZhMekh, No 7, 1955)

SO: Sum-No 787, 12 Jan 56

TARAKOVA, Ye. M., and P. PAVLYUK, M. Ye.

"Influence of Additions of Salts Upon the Cohesion of the Raw Material and Upon Mechanical Strength of Ceramic Made from the Clays and Loams of Turkmenistan," Izv. AN Turkm. SSR, no. 4, pp 67-71, 1954

The authors present results of tests on the addition of salts to loams (soil containing sand and 25-50% clay) from the open pits of the Bayram-Ali and Bami plants, with the aim of clarifying the dependence of the mechanical strength upon the qualitative and quantitative composition of the salts in ceramic and in the raw material. Sodium chloride added to clay or loam in the amount 1.2% lowers the cohesion of the raw material. Maximum drop in cohesion to 33% occurs for additions of 2% of sodium chloride. Salts of calcium, sodium, and magnesium in the amount of 2.5% increase the cohesion of the raw material; natural viterite does not change the cohesion of the raw material; barium chloride does not lower it. (RazGeol, No 4, 1955)

Sum. No. 481, 7 Oct 55

TARASOVA, Ye.M.; GORBESHKO, R.P.

Saving Portland cement in making mortars and concretes based on
local aggregates and fine-grained sands. Trudy Inst. antiseism.
stroi. AN Turk. SSR 3:112-131 '58. (MIRA 13:10)
(Turkmenistan--Concrete) (Aggregates (Building materials))

TARASOVA, Ye.M.; GORBESHKO, R.P.

Behavior of brick masonry in the dry hot climate of the Turkmen
S.S.R. Trudy Inst. antiseism. stroi. AN Turk. SSR 3:140-144 '58.
(Turkmenistan--Bricks--Testing) (MIRA 13:10)

TARASOVA, Ye.M.; KOVALENKO, A.F.

Using soil cement mixes in rural construction. Trudy Inst. antiseism.
stroi. AN Turk. SSR 3:170-205 '58. (MIRA 13:10)
(Soil cement) (Turkmenistan--Building)

TARASOVA, Ye.M.

Plastering of masonry work containing salt. Trudy Inst. antiseism.
stroi. AN Turk. SSR 3:206-220 '58. (MIRA 13:10)
(Asia, Central--Plastering)

TARASOVA, Yo.M.; KERBABAYEVA, E.A.

Selection of the composition of concretes made of Turkmen materials
in which fine sands are used. Trudy Inst. antiseism. stroi. AN Turk.
SSR no.2:66-72 '58. (MIRA 17:6)

TARASOVA, Ye.M.; GORBESHKO, R.P.; KERBAYEVA, E.A.

Saving portland cement in mortars and concretes made of nonstandard
Turkmen fillers using active finely-milled additives. Trudy Inst.
antiseism. stroi. AN Turk. SSR no.2:73-78 '58 (MIRA 17:6)

TARASOVA, Ye.M.; MURAV'YEVA, M.Ya.; TARNIZHEVSKAYA, T.M.

Corrosion of concrete made of Bezme in portland cement and of local
Turkmen fillers in sulfate and magnesian aggressive media. Trudy
Inst. antiseism. stroi. AN Turk. SSR no.2:90-107 '58.
(MIRA 17:6)

TARASOVA, Ye.M.

Selecting the quality of mortar for plastering of saline masonry.
Trudy Inst. antiseism. stroi. AN Turk. SSR no.2:108-111 '58.

Determining by chemical analysis the suitability of clays and
loams of Tataria for the manufacture of air-resistant brick.
Trudy Inst. antiseism. stroi. AN Turk. SSR no.2:112-114 '58.
(MIRA 17:6)

TARASOVA, Ye.M.

Possibilities for obtaining local binders based on clays and clayey
soils of the Turkmen S.S.R. Trudy Inst. antiseism. stroi. AN Turk.
SSR 3:221-226 '58. (MIRA 13:10)

(Turkmenistan--Binding materials)

TARASOVA, Ye.M.

Heat-insulating material based on loesslike clayey soils of Turkmenia.
Trudy Inst. antiseism. stroi. AN Turk. SSR 3:227-230 '58.

(MIRA 13:10)

..(Insulation (Heat))

TARASOVA Ye. N.

SARATIKOV, A.S.; TARASOVA, Ye.N.; KHOMYAKOVA, A.F.

Synergism of camphor and adrenalin [with summary in English]. *Farm.*
1 toks. 20 no.5:84-90 S-O '57. (MIRA 10:12)

1. Kafedra tekhnologii lekarstvennykh form i farmakologii farma-
tsevticheskogo fakul'teta (zav. - prof. A.S.Saratikov) Tomskogo
meditsinskogo instituta.

(EPINEPHRINE, effects,

synergistic action of camphor (Rus))

(CAMPHOR, EFFECTS,

synergistic action of epinephrine (Rus))

1. 12687-63 EWP(j)/EWP(q)/EWT(m)/BDS APPTC/ASD P2-4 RM/JD
 ACCESSION NR: AP3001598 3/0138/63/000/005/0049/0051

AUTHOR: Korchagin, Yu. M.; Savos'kina, V. P.; Tarasova, Ye. S.

TITLE: A new phenol adsorption method for determining the adsorption surface of carbon black

SOURCE: Kauchuk i rezina, ²²no. 5, 1963, 49-51

TOPIC TAGS: carbon black, adsorption, adsorption surface, roughness, phenol adsorption

ABSTRACT: In view of the coarseness of furnace carbon black and its unsatisfactory performance as reinforcing filler in tires, it is important to know the exact coefficient of coarseness (the ratio of its adsorption surface to the geometrical surface). The authors present a simple new test for the determination of the adsorption surface of furnace carbon black PM-70. This test was recommended by the Laboratory of the Scientific Research Institute of the Tire Industry, which adopted it at their carbon black plant after a thorough check. The method is based on the determination of the amount of phenol adsorbed by a weighed sample of carbon black from an aqueous phenol solution

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L 12687-63
ASSOCIATION NR: AP3001598

of known concentration, measured by interferometer. The authors added another simplification to the procedure of determining the true adsorption surface of furnace carbon black by replacing the tedious heating of 700C in a nitrogen current by an experimentally established coefficient which permits the calculation of the degassed surface of carbon black from its original one. Orig. art. has: 1 chart and 2 tables.

ASSOCIATION: Barnaul'skiy sazhevy*yzavod (Barnaul Carbon Black Plant)

SUBMITTED: 00

DATE ACQ: 08Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 000

OTHER: 000

Card 2/2

TARASOVA, Yuliya Andreyevna

[Circulation and turnover of capital] Krugoborot i oborot kapitala. Moskva, Vysshaya shkola, 1960. 79 p. (MIRA 14:9)
(Capital)

Structural changes in rubber by the action of molecular oxygen. II. Kinetics of the destructive solution of vulcanized rubber. B. Bogdanov and Z. Tarasova (M. V. Lomonosov Inst. Pure Chem. Technol., Moscow). *J. Gen. Chem. (U.S.S.R.)* 17, 1401-1410 (1947) (in Russian). *Chem. Abstr.* 40, 10855; *Russk. Khim. Obshchestvo*, 1945. — Proof was sought and obtained of the indispensability of O for soln. of vulcanized rubber and, consequently, of the main-valence nature of vulcanization, as opposed to the intermol. forces theory advocated by Williams (C.A. 32, 8210) on the basis of his peptization expts. A mixt. of smoked sheet 100 S 2, tetramethylthiuram disulfide 0.2, ZnO 1, and stearic acid 1, was vulcanized at 141° ± 0.5° (optimum in 20 min.) with the characteristics: CHCl₃ ext. 8%, Me₂CO ext. 3.8%, combined S 1.65%. Vulcanization was carried out on thin layers coated (in O-free C₆H₆ soln.) on the outer surface of a cylindrical glass ampul, in the absence of O (CO₂ atm.); the vulcanized product was then extd. with cold CHCl₃ in the dark and in a current of pure N for 10 hrs., and the ampul carrying the film was immersed in a thermostated closed vessel filled with xylene and equipped with a reflux condenser to prevent losses of solvent by the stream of gas bubbled through the vessel at a const. rate. Progress of the soln. was observed by microbalance weighings of ampul and film. With O rigorously excluded in current of N, only 2.8% of the wt. of the film was dissolved in 15 hrs. at 102.5°. That, contrary to Williams, peptization does not take place in the absence of O was demonstrated in expts. with 0.01 g. of vulcanizate, heated sealed tubes at 141°, 72 hrs., in the presence of 10 cc. N-satd. xylene, and 0.2 g. of Na oleate, 0.04 g. of piperidine, or 0.04 g. of the condensation product butyraldehyde with aniline; no evidence of peptization was

observed either on heating or on 1 year's standing. In sharp contrast to this, the film did dissolve in xylene at 102.5° in a current of O; the relative rate of soln. v , the percentage r of rubber dissolved relative to the initial wt. of the film, is the slower the greater the initial thickness d_0 of the film, complete soln. being reached in from 100 to 250 min. with d_0 from 0.08 to 0.25 mm. For each given d_0 , the curve of r against time is linear up to about $r = 50\%$, then deflects and becomes increasingly steeper. Obviously, the const.-velocity portion corresponds to the

stage of const. accessible surface area, while the acceleration indicates progressive disintegration and lifting from the glass wall. Correspondingly, while the r curves fan out from a common origin at 0, the plot of the abs. rate of soln. v (g. rubber dissolved) involves one common rectilinear portion for all d_0 , the curves branching out only at the disintegration stage. Assuming the continuation of O at the surface to be the rate-dtg. step, at const. concn. of O, $v = k_1 s$ (s = surface area) and $v = k_2 d_0 / d_1 d_2$ (where d = thickness of surface layer dissolved per unit time, $d = d_0$ of the vulcanizate), or $rd_0 = kd = \text{const.}$; this is confirmed by the exptl. data, e.g., $d_0 = 0.08, 0.135, 0.173, 0.232$ mm., $r = 51.6, 37, 32, 22\%$ per min.; under O at 750 mm. Hg. at 102.5°, $d = 5.9 \times 10^{-3}$ cm./sec.; $v = 3.4 \times 10^{-3}$ g./sq. cm./sec. In terms of the partial pressure p of O, v (in the const.-rate range) increases linearly with p up to about $p = 400$ mm. Hg., whereafter the increase of v with further increasing p (up to 700) becomes gradually slower; $p = 22.4, 187.0, 400.0, 555.0, 700.0, 10^6$ mm. Hg. $v = 0.31, 1.05, 2.73, 3.20, 3.44$. The dependence can be expressed by $v = k' p / (1 + p)$, assuming v to be proportional to the no. of points occupied by O, equal to $p / (1 + p)$ by a derivation analogous to

Structural changes in rubber produced by molecular oxygen. III. Properties of the destructively dissolved vulcanizate of natural rubber. B. Dogadkin, Z. Larasova, and A. Pasynskii (M. V. Lomonosov Inst. Fine Chem. Technol., Moscow). *J. Gen. Chem. (U.S.S.R.)* 17, 2222-8 (1947) (in Russian); cf. *C.A.* 42, 2799a.

2000f. On standing, the light yellow, opalescent product of the destructively acid dissolved vulcanizate pptd. ZnO; from the supernatant clear soln., Me_2CO seps about 70% of the product in the form of a sticky mass which, after drying in vacuo at 20°, is sol. in the usual rubber solvents; its content of combined S is 1.98%, i.e., the same as in the original vulcanizate; the O content is 50 mg./g., of which 3.77 mg. is free carboxyl (O); hence, for each carboxyl, there is a hydrocarbon residue of mol. wt. of about 8000. Owing to the high content of carboxyl groups and the low mol. wt., the product is sol. in binary solvents involving assoc. liquids (e.g., $\text{C}_6\text{H}_6 + \text{EtOH}$). Specific viscosity η , at concns. c up to 0.6%, is a linear function of c ; the const. $k = \eta/c$ (η = sp. vis.) depends on the depth of the destruction; for the product pptd with Me_2CO in soln. in CCl_4 , $k = 48$ at 20°. This gives, according to the formula of Mehl, *et al.* (*C.I.* 34, 7307), for the ratio of the axes of the ellipsoidal particles, $b/a = 24$, in contrast to 117-123 calcd. in the same way for the sol. fraction of natural rubber, and about 100 for plas-

tized butadiene styrene copolymer (from flow birefringence detns.); consequently, particles of the destructively dissolved vulcanizate are different from those of nonvulcanized rubber. Scattering of light is a linear function of c , in contrast to crude rubber. From photographic measurements of the diffusion coeff. D of solns. in CCl_4 , the mol. wt. M was calcd. by the equation of Polson (*C.I.* 33, 8084) $M = k/D\eta^2$, where for the given solvent, $k = 2.70 \times 10^{-10}$ (at 20°), and the asymmetry factor f is taken = 2.15; with the exptl. $D = 8.84 \times 10^{-7}$ sq. cm./sec., $M = 3000$. On the other hand, from the max. ordinate of the diffusion curve, $D = 6.62 \times 10^{-7}$; the discrepancy indicates polydispersity of the product. By the values of b/a and av. M it can be estd., as a first approximation, that the particles consist on the av. of 4-5 linked chains of 10-12 isopentene groups each if it is assumed that such particles are massive fragments of the spatial structure of the vulcanizate. Films obtained by dissolving the Me_2CO pptd. product in C_6H_6 and evapg. the solvent had tensile strength of 7.2-7.5 kg. per sq. cm. and elongation of 250%, in contrast to 100-200 and 900 for the original vulcanizate. This conflicts with the assertion of Williams (*C.I.* 32, 8210) that the strength of vulcanized films is almost the same before and after peptization. N. Flom

ASB-55A METALLURGICAL LITERATURE CLASSIFICATION

TARASOVA, Z.

Jun 47

USSR/Chemistry - Rubber, Vulcanizing
Chemistry - Rubber, Reclaiming

"Destructive Dissolving of Vulcanized Rubber," B. Dogadkin, Z. Tarasova, A. Pasynskiy,
Moscow Inst Fine Chem Tech, 4 pp

"Dok Akad Nauk SSSR, Nova Ser" Vol **LVI**, No 7

Asserts that vulcanization should be considered process in which main feature is formation of spatial structure for molecular chains, connected in operation of vulcanizing agent by forces of main valences. Describes process of destructive dissolving of rubber, undoubtedly of great importance in technical processes of refurbishing rubber by dissolving method. Illustrated with graphs.

PA 60T12

CA

Solubility of oxygen in some organic liquids. M. Reznikovskii, Z. Tarasova, and B. Dogadkin (Moskov. Inst. Tsel'noi Khim. Tekhnol. im. M. B. Lomonosova). Zhur. Obshchei Khim. (J. Gen. Chem.) 20, 63-7 (1950). The following solubilities were detd. under atm. pressure, in ml. O₂/ml. solvent: in tech. xylene (fraction b. 134-140°) 0.177 (at 23°); toluene, 0.128 (20°); ligroin (fraction 110-20°) 0.166 (20°); white spirit (fraction 165-200°) 0.170 (19°); cracking gasoline (fraction 115-50°) 0.174 (19°). In the tech. xylene, at 23, 80, and 100°, sol. 0.177, 0.226, and 0.268 ml. O₂/ml. solvent, and the absorption coeff. (ml. O₂ (S.T.P.)/ml. solvent) = 0.102, 0.179, and 0.102, resp. The pos. temp. coeff. is accounted for thermodynamically by the work spent in the isothermal compression of the gaseous vol. v_g to its vol. in the soln., v_l , approx. equal to the vol. of the solvent. This gives $\Delta H \sim RT \ln v_l/v_g = RT \ln L$, where $L = v_l/v_g$. In ml./ml., and $\Delta H = RT (\ln L + 1)$; hence $\Delta H = 1$ at $L \sim 0.37$, i.e., the temp. coeff. of the sol. is pos. at solubilities below 0.37 ml./ml., neg. at solubilities greater than 0.37. N. Thon

Destructive solution of vulcanized synthetic rubbers.
B. A. Dogalkin and Z. Tarasova. *M. V. Leningradsk. Inst. Khim. Tekhnol., Moscow. Doklady Akad. Nauk S.S.S.R.* 73, 70 (1959). — The rate of soln. in xylene at 65–110°, in O₂ under a pressure of 760 mm. Hg, increases in the order: butyl (I) < Na-butadiene polymer (II) < natural rubber copolymer (III) < polychloroprene (IV) < butadiene-styrene copolymer (V). This order corresponds to the contents of double bonds in the main chains of the polymers, with the added slowing-down effect of electrophilic groups in the nodes; it is owing to this latter effect that IV dissolves more slowly than V. Double bonds in the side chains have no effect on the rate of soln., rather, interference between O and side-chain vinyl groups leads to structure formation, i.e., the reverse of destructive disoln. (on the basis of expts. with butadiene rubbers differing in the proportion of double bonds in the main chain) of the 1–4 type (50, 54, and 55°, relation to natural rubber taken as 100%). The rate of destructive soln. increases linearly with that proportion. The straight line does not pass through the origin; this indicates that double bonds of the 1–2 type are involved in the reverse process of structure formation. At const. O pressure, the rate of soln. $V = k_1 c - k_2 \cdot 1 - c = k_3 - k_4 + k_5 + k_6$, where c is the concn. of double bonds of the 1–4 type, 2 opposing processes. For vulcanizates const. tetraethylthiuram disulfide as accelerator, under 760 mm. Hg of O, at 1–4 that of 1–2 type. The rate of soln. of the 1–4 type increases and provided the surface area of the vulcanizate remains const., V (in g. sq. cm./min.) = $-4 \times 10^{-4} + 1.2 \times 10^{-2} c$, where c is expressed in % of the total double bonds of the polymer. This relation makes it possible to det. c from the observed V . In terms of the surface area S and the O concn., the rate of soln. is $k_1[O]S$; the area S of the O concn., the temp. range 23–100° is given by $S = 0.0485 V$. With this expression for $10^3 k_1$ against 150–55° of soln. from the linear plots of $\log k$ against $1/T$, are det. as II 31.3 (100–252°), III 27.2, and V 10–17, are det. as II 31.3 (100–252°). The high activation energies of II and III when compared with V are due to vinylpyridine side chains. The destructively dissolved vulcanizate II forms a yellowish opalescent soln., from which Me-Off dists. about 70% of the substance; the ppt. dried *in vacuo* at 50°, is a sol in all the usual rubber solvents. Chem. analysis shows carboxyl 0.54 mg./g., ether-O 0.12 mg./g., peroxide-O 1.07, total O 4.7%. By expt-O in C₆H₆, the particle wt. is 3900–2400, and increases with decrease in concn. The sp. viscosity $\eta_{sp}/c = 2.0$ dl./g., where c is sp. vol. of the vulcanizate and η is concn. in g./dl. The numerical value of the coeff. gives for crude Na-butadiene elastomer. The fact that this coeff. is about 10 times greater than the coeff. of the Einstein equation indicates that, as a result of swelling, the effective vol. of the particles of the destructively dissolved vulcanizate is about 10 times greater than in the solid state. Thus

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USSR/Chemistry - Rubber, Synthetic

Jun 52

"Structural Changes in Rubber Caused by the Action of Molecular Oxygen. V. Destructive Solution of Vulcanized Synthetic Rubber," Z. Tarasova, B. Dogadkin

"Zhur Obshch Khim" Vol XXII, No 6, pp 935-945

Vulcanized synthetic rubbers, when heated in hydrocarbon media containing molecular oxygen, completely go into solution. The kinetics of destructive solution of vulcanized synthetic rubbers conforms to the same laws as that of natural rubber. The rate of destructive solution depends on the molecular structure of the rubber. In ascending order, the rate of destructive solution is:

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USSR/Chemistry - Rubber, Synthetic (Contd 1) Jun 52

butyl rubber ← sodium-butadiene ← butadiene-styrene
← chloroprene ← natural rubber. The apparent energy of activation for natural rubber is 19 kcal/mol, for sodium-butadiene 31.2 kcal/mol, for butadiene-styrene 27.1 kcal/mol. The rate of destructive solution of butadiene rubber is in a linear relation to the content of structure of type 1,4 (ratio between double bonds in main and branch chains) in the rubber mol. The mechanical property of vulcanizates have no appreciable effect on the rate of destructive solution. The accelerators used are of great importance, and their effect corresponds to their action on the rate of oxygen addition. Water, by retarding the addition of oxygen, retards the solution of vulcanizates from natural
218716

TARASOVA, Z.

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TARASOVA, Z.

USSR/Chemistry - Rubber, Synthetic (Contd 2) Jun 52

and sodium-butadiene rubber. The rate of destructive soln of vulcanizates in various solvents is in linear relation to the coeff of absorption of oxygen in the solvent. The viscosity of solns of destroyed vulcanized sodium-butadiene rubber is linearly dependent on the concn up to 5%. The av mol wt of particles, detd cryoscopically for sodium-butadiene vulcanizate is 2,400 to 3,600, osmotically 16,000. The axis ratio is 1:15. It is suggested that solns of destroyed vulcanizates are a special type of colloidal solns.

218716

PA 239T22

USSR/Chemistry - Rubber Vulcanizers
Accelerators

Aug 52

"Thermal Decomposition of Vulcanized Structures of Deformed Vulcanizers Containing Different Accelerators," B. Dogadkin and Z. Tarasova, Sci Res Inst of Tire Production

"DAN SSSR" Vol 85, No 5. pp 1069-1072

The thermal stability of vulcanized rubber will depend on what type of bond prevails in its mol. In S-vulcanized rubber, there are four possible types of bonds, i.e., C - C, C - S - C, C - S - C, and C - S_n - among natural and butadiene rubbers: vulcanized with

239T22

S alone, without S, with tetra-methylthiuram disulfide, with S and diphenylguanidine accelerator, and with S and mercaptobenzothiazole accelerator. By measuring the strain relaxation at 70° and 100° in an inert atmosphere and using some other data (solubility in synthlm, etc.), these rubbers were characterized with respect to the prevalent bonds. Submitted by Acad P. A. Rebinder 29 May 52.

239T22

Rubber Abstracts
April 1954
Crude Rubber

1493. Vulcanisation structures and their effect on the thermal stability and fatigue of rubber. J. N. JUGADEF and Z. N. TARASOV. *Rubber Chem. Technol.*, 48, 1617, 1965, 15, 317. (Soviet Rubber, 1965, 48, 1617). The bound sulphur present in a vulcanisate (a%) consists of b% polysulphide, c% disulphide, and (a-b-c)% monosulphide. The b value can be determined by extracting the vulcanisate (after preliminary extraction with cold acetone with 10% sodium sulphate solution) and c is found by treating the vulcanisate with hydrochloric acid and determining the evolved hydrogen sulphide. This hydrogen sulphide originates from zinc sulphide and the amount of zinc sulphide is equivalent to that of the S-S group present. Smoked sheet vulcanised with 7% sulphur without an accelerator contained a 5.2, b 0.245, and c 0.57%; a second vulcanisate made with 3% tetramethylthiuram disulphide without sulphur contained a 0.7, b 0, and c 0.02%; a third made with 7% sulphur and 1% diphenylguanidine contained a 4.7, b 0.82, and c 0.62%; and a fourth with 3% sulphur and 1% mercaptobenzthiazole contained a 2.8, b 0.11, and c 0.22%. All vulcanisates contained 5% zinc oxide. When they were kept extended in pure nitrogen at 70° C., the stress σ decreased in time t at a rate which was identical for all the above vulcanisates which shows that, at 70° C. rearrangement of the chains, but no rupture of the crosslinkages occurs. The gradual decrease of σ at 100° or 130° C. was slow for vulcanisates 2 and 4, more

B.A.D. - 1/2

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rapid for 3, and very rapid for the first, σ in the first decreased to nothing in 4 hr. at 130° C. Except for the first few minutes or hour σ was proportional to e^{-kt} ; at 130° C. 1,000k min⁻¹ was 24, 0.86, 8.5, and 1.0 for the first, second, third, and fourth vulcanisates respectively. The swelling in xylene was, after relaxation, 39, 70, and 46% greater than before for the first, second, and third vulcanisates respectively. Similar results were obtained with vulcanisates of butadiene-styrene copolymer. The swelling of these vulcanisates, however, was smaller after than before relaxation. This was due to an increase of σ during relaxation (σ g., to 3.2% from 1.7% for a vulcanisate made with 7% sulphur without an accelerator). When the increase in σ was avoided by extracting the free sulphur before extension, swelling after was greater than before relaxation. The σ of the butadiene-styrene vulcanisate did not decrease to zero at 130° C. After a second extension, the decrease of σ was slower than after the first one; thus the cross-links formed during the first relaxation were stronger than the original links (monosulphides instead of disulphides). The swelling of this vulcanisate increased after heating at 130° C. in nitrogen, i.e.,

some bonds were broken by heating alone, without a stress. This thermal rupture of bonds may be a cause of the optimum temperature of vulcanisation. The number of rapid extensions and contractions before rupture at 100° C. in nitrogen was smallest for the butadiene-styrene copolymer vulcanised without an accelerator.

35720

TARASOVA, Z.

B. T. R.
Vol. 3 No. 4
Apr. 1954
Rubber and Elastomers

5724* Thermal Decomposition of Vulcanized Structures of Deformed Vulcanizates Containing Various Accelerators. D. Doradkin and Z. Tarasova, *Rubber Chemistry and Technology*, v. 26, Oct-Dec. 1953, p. 759-783. (Translated from *Doklady Akademii Nauk SSSR*, v. 65, no. 5, 1952, p. 1069-1072.) Previously abstracted from original. See item 1656, v. 2, Feb. 1953.

TARASOVA, Z.N.

7
3800. Investigation of the influence of the bonding layers upon the uniformity of phed-up butadiene-styrene vulcanisates. S.M. K. KIRKORIAN, Z. N. TARASOVA, M. M. HEGNIKOVSKI, and B. A. DOVAD.

KVM Prochnost Svyazi 1954, p. 151-7.
Vses. Khim. Otechest. 1954, p. 151-7.

The authors have investigated the influence of the bonding layers upon the uniformity of phed-up butadiene-styrene vulcanisates. It is shown that as a result of the high rate of diffusion of the low molecular weight ingredients dissolved in the bonding agent, the bonding layer at the interface of the vulcanisate and the bonding agent is enriched with these ingredients. This leads to a decrease in the bond strength.

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USSR/ Chemistry - Synthetic rubber

Card 1/1 Pub. 22 - 40/56

Authors : Tarasova, Z.; Kaplunov, M.; and Dogadkin, B.

Title : Interchange reactions in vulcanized rubber

Periodical : Dok. AN SSSR 99/5, 819-822, Dec 11, 1954

Abstract : Two types of vulcanized butadiene styrene rubber one of which contained S, diphenylguanidine and ZnO and the other - tetramethylthiuramdisulfide and ZnO were investigated to determine the interchange reactions occurring in vulcanized rubber. The method employed in the study of interchange reactions, is described. It was established that the S in polysulfide bonds of vulcanized rubber enter into an isotopic exchange with the radioactive S whereas S in mono- and disulfide bonds will not submit to interchange. The relative S-content in polysulfide bonds is determined by the interchange intensity of the sulfur bound in the vulcanized rubber. Six references: 4-USSR; 1-USA and 1-English (1944-1954). Table; graphs

Institution: Scientific Research Institute of Tire Industry

Presented by: Academician V. A. Kargin, June 22, 1954

TARASOVA, Z.

✓ 1383 Theory of vulcanisation and of the action of
accelerators. B. DOGADKIN, V. SELVUKOVA, Z.
TARASOVA, A. DOBROMYSLOVA, M. TSHENSTEIN.
Dokl. Akad. Nauk SSSR, 1966, 217, 109-210.

109-210. English translation. Vulcanisation of rubber by dibenzthiazolyl disulphide (without sulphur) is a radical-type reaction. Kinetic curves were obtained for the conversion of dibenzthiazolyl disulphide into mercaptobenzthiazole and the addition to the rubber molecules. Changes in molecular weight were followed during vulcanisation of rubber solutions. Vulcanisation troubled the molecular weight. Vulcanisates were found to contain transverse C-C bonds between the molecular chains of rubber and the presence of benzthiazolyl groups in the vulcanisate structure was proved. The kinetics of the vulcanisation of rubber by sulphur in the presence of dibenzthiazolyl disulphide was studied. Seventeen references are given.

35720

TARASOVA, Z.

Theory of vulcanization and the action of accelerators.
B. A. Derzhak, V. Selyukova, Z. Tarasova, A. Dobromy-
slava, M. Feldshchik, and M. Samoylov (Trans. Fine Chem.
Technol., Moscow). *Kolloid Zhur.* 17, 215-20 (1955); *Ch.*
C.A. 48, 1047c. Na-butadiene rubber (I) was vulcanized
by heating at 143° with (e.g., 6%) benzothiazolyl disulfide
(II) in toluene in N₂; e.g., after heating for 0 hrs., the mol.
wt. was 300,000 when the initial mol. wt. was 100,000, and
the S concn. was 0.1%; about 40% of the initial II was de-
compd., and about 0.5 the decompd. II was transformed
into mercaptothiazole. An analogous vulcanization
in the solid state gave, in 0 hrs., a product with elasticity
modulus *E* of 5 kg./sq. cm. The rate of stress relaxation of
these vulcanizates was increased by substituting S for a part
of II; this showed that, in the reaction between I and II,
more stable C—C bonds form, while the reaction between I
and S results in less stable —S—S— bonds. The no. of
bonds produced by 1 mol. of II attached to I was 1.1-5.4.
The mechanism of this bond formation is discussed. Heat-
ing of isoprene (III) with II at 135° caused about 30% poly-
merization of III. When I was vulcanized with a mixt. of S
and II, the rate of reaction increased linearly with the ratio
of II to I. The increase of *E* with the S content of the vul-
canizate was greater, the greater the proportion of the 1,4-
isomer in I. The S of the vulcanizate, by using S^m, was
shown to exchange with the S in II or with free S. The reac-
tions of the α -CH₂ group of rubber chains are very important
for vulcanization.
J. J. Bicerano

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TARASOVA, Z. N.

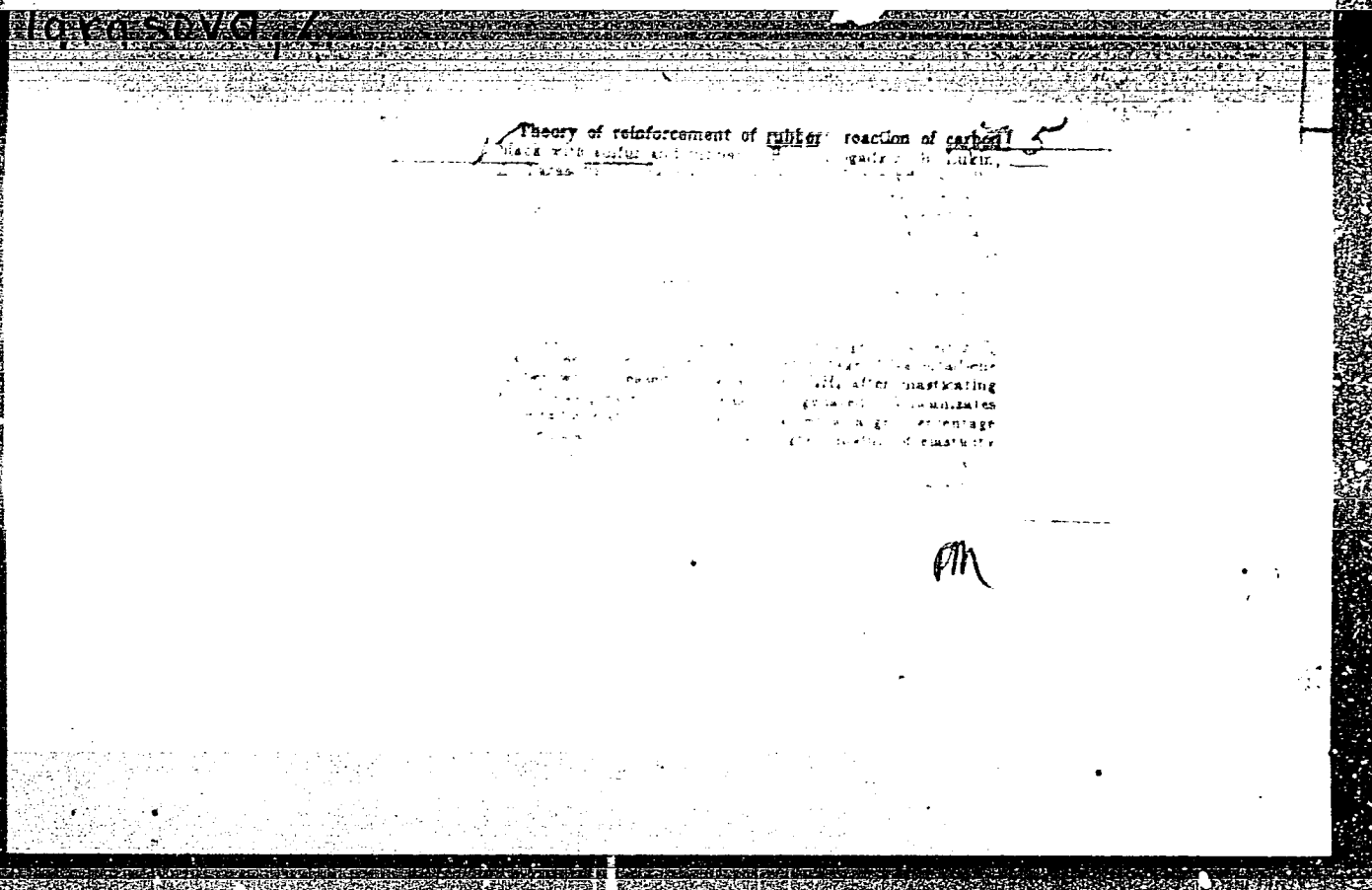
✓497. Use of radioactive sulphur for study and control of the vulcanisation process. Z. N. TARASOVA, M. Y. KAPLUNOV, and B. A. DOGADKIN. *Zavodskaya Lab.*, 1953, 21, 396-7; *Chem. Abn.*, 1953, 49, 13681. The rubber mixture is compounded with the addition of S^{35} and the product is milled to about 0.3 mm (approximately the travel distance of emitted electrons). After vulcanisation, the samples are counted for S^{35} . A calibration curve is shown, which was constructed from the usual oxidation method of detecting sulphur. The method gives results which agree with those of oxidation procedures; it was successfully applied to the study of the course of vulcanisation of several rubber formulations. The time required is 8 to 10 min.

3672

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PARASOVA, Z.

✓ Theory of reinforcement of rubber reaction of carbon
black with sulfur and rubber. B. A. Dogadkin, B. Lukin,
Z. Tarnova, Z. N. Skorodumova, and I. Tutorskil. Col-
lect J. (U.S.S.R.) 43, 407-12 (1950) (English translation).—
See C.A. 51, 16366. *Mello*
—B. H. H.

TARASOVA, Z. N.

TARASOVA

15
Vulcanization of butadiene-styrene and natural rubber.
I. I. Etkinson, G. P. Shcherbakov, Z. N. Tarasova, M. K.
Khrumov, and M. P. Strel'nikova. U.S.S.R. 106,357,
July 25, 1957. Methylene blue, Rhodamine B, or methyl
violet are incorporated in the rubber as vulcanization ac-
celerators and to prevent scorching. M. Hesch

✓ 4941. Use of radio-active isotopes in the rubber
industry. M. YA. KAPLONOV and V. N. PARASOVA.
K. Zhukovskiy, 1957, 18, No. 3, 15 R. [unclear]

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Sci Res Inst. Tire Industry

DOGADKIN, B. A., TARASOVA, Z. N., BAS'KOVSKAYA, M.O. and KAPLUNOV, M. Ya.
(Scientific Research Institute of the Tire Industry)

"The Formation of Vulcanization Structures and Their Modification by Thermo-Chemical Reaction and Fatigue."

Isotopes and Radiation in Chemistry, collection of papers of and
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and
Radiation in National Economy and Science, Moscow, 124-vol. AN SSSR, 1963, 1004.

This volume publishes the reports of the Chemistry Section of the
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and Radiation
in Science and the National Economy, sponsored by Acad. Sci. USSR and Main
Admin. for Utilization of Atomic Energy (under Council of Ministers USSR),
Moscow, 2-12 April 1963.

TARASOVA, Z.N., KAPLUNOV, M. Ya. and DOGADKIN, B. A.

"Structure and Properties of Vulcanized Rubbers Obtained by the
Action of Nuclear Radiation"

Truly Transactions of the First Conference on Radioaction Chemistry, Moscow,
Izd-vo AN SSSR, 1958. 330pp.
Conference -25-30 March 1957, Moscow

SOV/138-58-5-4/9

AUTHORS: ~~Tarasova, E.N.,~~
Kaplunov, M.Ya.,
Dogadkin, B.A.,
Karpov, V.L.
Bregier, A.Kh.,

TITLE: Vulcanisation by Nuclear Radiation (Vulkanizatsiya
pod vozdeystviyem yadernykh izlucheniya)

PERIODICAL: Kauchuk i Rezina, 1958, ¹⁷Nr 5, pp 14-21 (USSR)

ABSTRACT: During recent years it was found that polymeric materials undergo deep structural changes when irradiated with high energy rays (x-rays and nuclear radiation). Investigations on the vulcanisation of rubbers and rubber mixtures by radioactive irradiation were carried out (Refs.1-7). This method of vulcanisation is called "radiation" vulcanisation. The authors investigated the structure and the properties of radiation vulcanisates obtained by irradiating rubbers and their mixtures in an atomic reactor and by gamma radiation from Co⁶⁰. They also determined the conditions for preparing the homogeneous

Card 1/5

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Vulcanization by Nuclear Radiation

solid and multi-layer articles (tires) by the action of nuclear radiation. The following articles were tested: natural, butadiene-styrene SBR-30, and SBR-30M, isoprene S.I. and sodium-styrene S.I. The rubbers were vulcanized in thin layers in steel or aluminum moulds. The degree of cross-linking of the molecular chains of rubber during irradiation depends on the structure of the rubber and on the molecular weight of the rubber. It is also affected by the presence of oxygen. The influence of the medium in which radiation takes place on the degree of structure formation of purified natural rubber during radiation vulcanization is shown graphically in Fig.1; the influence of the medium on the kinetic formation of cross-links during radiation vulcanization is tabulated (Table 1). On studying the infrared spectra it was noted that the presence of phenyl- and methylamine strongly inhibited the oxidation processes during irradiation. Spectra of electron paramagnetic resonance showed that samples of SBR-30M irradiated in air had increased

Card 2/5

SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

content of free radicals (Table 3). The effect of anti-oxidants on the properties of radiation vulcanisates is due, to a considerable extent, to the decreased number of double bonds in the presence of anti-oxidants. Fig.2: the relaxation of tension of rubbers subjected to radiation vulcanisation in air; Fig.3: the dependence of the constant of the rate of relaxation of the above vulcanisates on the number of cross-links. Due to the high power of penetration of nuclear rays, uniform vulcanisation is achieved throughout the sample (Table 4). The thickness of the vulcanising grate is defined by the dosage of absorbed energy, by the type and composition of the rubber, by the amount of fillers, plasticisers and anti-oxidants in the mixture and the conditions of irradiation as well as by some other factors. The radiation vulcanisates show thermo-mechanical stability surpassing the stability of vulcanisates containing thiram. Activated carbon decreases the rate of chemical relaxation of radiation vulcanisates.

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SOV/138-56-5-4/9

Vulcanisation by Nuclear Radiation

During the irradiation of purified rubbers intense oxidation occurs; this leads to complete loss of unsaturation when the dosage of irradiation = 50 megaröntgen. In this case the amount of double bonds is decreased to 30%. Conditions for preparing homogeneous vulcanisation grades were found to be independent from the thickness of the samples (within the limits of 0.1 - 40 mm). The physico-mechanical and technological properties of rubbers prepared by vulcanisation radiation were tested (Table 5). It was found that these vulcanisates were more resistant to thermo-oxidative ageing than sulphur-vulcanisates (4 - 5 times at 130°C), undergo small residual deformation, show low hysteresis and high recovery when subjected to repeated deformation. The vulcanisation of model tyre casings 7.50 x 20, 1/5th natural size, was carried out (Fig.8). Changes in the physico-mechanical characteristics of various tyre cords during irradiation in an atomic reactor are given in Table 7. Members of the Institute

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SOV/138-58-5-4/9

Vulcanisation by Nuclear Radiation

im. L.Ya Karpov: V.B.Osipov, V.A.Gol'din, V.S.Pokrovskiy
and V.P.Afonin assisted during these experiments. There
are 8 figures, 7 tables and 14 references of which
10 are English and 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy
promyshlennosti (Scientific-Research Institute for
the Tire Industry)

Card 5/5

SOV/138-58-7-2/19

AUTHORS: Dogadkin, B.A., Eytingon, I.I., Tarasova, Z.N., Khromov, M.K., and Strel'nikova, N.P.

TITLE: The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber (Primeneniye alkil-fenolal'degid sul'fidnykh smol dlya povysheniya kleykosti i prochnosti svyazi v izdeliyakh iz butadiyen-stirol'nogo kauchuka)

PERIODICAL: Kauchuk i rezina, 1958, ⁷Nr 7, pp 5 - 10 (USSR)

ABSTRACT: Alkylphenolaldehyde sulphide resins increase the adhesion of butadiene-styrene rubber (Ref 1). These resins are obtained by treating the condensation product of n-tert.-butylphenol and formaldehyde with SCl_2 or S_2Cl_2 in an alkaline medium. The condensation product was dissolved in dry dichlorethane and a 20% solution was treated at a temperature equalling its boiling point with SCl_2 , diluted in an equal amount of dichlorethane. The boiling mixture was agitated for 90 minutes and the dichlorethane distilled in a vacuum at 60°C . The softening point of the formed resin = $53 - 55^\circ\text{C}$. On further heating to 135°C , the softening point increased from 70 to 120°C .

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SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

The initial condensation product had an average molecular weight of 260 and the following composition: 75.0% C, 9.2% H, 15.8% O. The molecular weight of the end product = 589 and had the following composition: 73.0% C, 8.6% H, 12.1% O, 6.3% S. The disulphide resins B were prepared by treating the condensation product of alkylphenol and formaldehyde with S_2Cl_2 in substantially the

same way as alkylphenolaldehyde monosulphide resins. The molecular weight of this resin = 589 which was approximately equal to the calculated value (585). Sulphide resins C were prepared from alkylphenol formaldehyde lacquer resins Nr 101 (VTO MKHP 2196-50) which is prepared by condensing n.-tert.-butylphenol with formaldehyde in an alkaline medium, and subsequently neutralising it with H_2SO_4 and hardening at 140 °C. The physico-mechanical properties of adhesives based on butadiene-styrene rubber SKS-30A containing sulphide resins and vulcanised in the

Card2/5

SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

absence of sulphur or accelerators for 60 minutes at 143 °C, are listed (Table 1). Sulphide resins increase the degree of vulcanisation but alkylphenolaldehyde resins decrease the degree of vulcanisation of rubbers based on SKS-30A (Table 2). The sulphide resins impart to the resins high moduli and a high degree of break-strength. Sulphide resins have the same degree of thermal stability and resistance to ageing as rubbers not containing these resins or phenolaldehyde resins. 60% of the total amount of sulphur, introduced into the rubber in the form of a resin, is chemically bound to the rubber. Sulphide resins also strengthen the rubber. From Table 3, it can be seen that the sulphide resins increase the dynamic modulus, internal friction and the strength of the rubbers. The effect of sulphide resins on the adhesive properties of adhesives based on SKB-30A is shown in Figure 2 and Table 4. An increase in the content of sulphur and accelerators (up to 5-10%) results in increased efficiency of the rubbers (Figure 3). The degree of deformation was

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SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

found to be in an inverse proportion to the modulus. However, an increase in the content of sulphur and accelerators in the adhesives achieves better co-ordination of various layers and a very strong layer is formed in the contact region. Sulphide resins are very good adhesives. An increase in the strength of the bond of the vulcanised rubbers is achieved without lowering the adhesive properties. The investigated alkylphenolaldehyde resins inhibit the vulcanisation of rubbers and thus decrease the strength of the bonds. Resins which simultaneously decrease the degree of vulcanisation of the rubbers as, for instance, resin Nr 101, decrease also the strength of the bonds of the rubbers.

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SOV/138-58-7-2/19
The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the
Adhesion and Strength of Bonds in Products Made from Butadiene-
styrene Rubber

There are 3 Figures, 4 Tables and 6 references, 2 of which
are English and 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlen-
nosti (Scientific Research Institute of the Tyre
Industry)

Card 5/5

1. Resins--Applications
2. Synthetic rubber--Bonding
3. Synthetic rubber--Properties

TARASOVA, Z. N.

69-20-1-7/20

AUTHORS: Dogadkin, B.A., Kuleznev, V.N., Tarasova, Z.N.

TITLE: Formation and Properties of Interpolymers of Natural and Butadiene-Styrene Rubbers (Polucheniye i svoystva mezhpolymerov natural'nogo i butadienstirol'nogo kauchukov)

PERIODICAL: Kolloidnyy Zhurnal, 1958, Vol. XX, # 1, pp 43-51 (USSR)

ABSTRACT: The coplastication of natural and butadiene-styrene rubbers by milling on a cold mill leads to the formation of an interpolymer containing 30% of the natural rubber introduced. The plastication was carried out on a specially constructed micro-mill in a hermetic casing. The milling was done in an atmosphere of purified nitrogen. The rubbers were preliminarily purified by hot acetone (natural rubber) or hot methanol (Butadiene-styrene rubber). The values for the characteristic viscosity and plasticity during milling are represented in figures 1 and 2. To prove the formation of an interpolymer during milling, several methods were used. In one, fractional precipitation, a selective precipitator had to be found; used was a binary mixture (1 : 4) of benzene-methylethylketone, in which

Card 1/4

69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene Rubbers

butadiene-styrene rubber dissolves completely, whereas natural rubber does not dissolve. For comparison the milled polymers were also dissolved. The solution was then separated, evaporated, and the content of natural rubber determined by an Abbe refractometer. Fig. 3 shows that in case of separately milled polymers the natural rubber begins to dissolve after 40 min. For selective vulcanization, polychloro-compounds were used, which do not vulcanize natural rubber. As an activator, ZnO and PbO in two parallel experiments was employed. The results have shown that 20-26% of the introduced natural rubber is being bound during plastication. The characteristic viscosity depends on the ratio of the rubbers in the mixture. Fig. 5 shows, that the values for the viscosity of the jointly milled polymers are higher than the corresponding values of the separately milled polymers. The investigation of the physical-chemical properties of the vulcanizates shows that the mixtures of natural and butadiene-styrene rubbers have a higher resistance to aging than natural rubber alone. The resistance to breaking, relative stretching and deformation is also dependent on the composition

Card 2/4

69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene Rubbers

of the mixture. An adhesive film made from interpolymers increases the binding strength between natural and butadiene - styrene rubbers when placed between them. It is supposed that the segments of the molecules of the natural rubber in the interpolymer, which are connected with the butadiene-styrene rubber by chemical bonds, penetrate easily into the natural rubber. The same is true for the segments of the butadiene-styrene rubber of the interpolymer, which penetrate into the butadiene-styrene rubber. The results of the tests for resistance of the connections by interpolymer adhesive films are shown in table 2.

Card 3/4

There are 9 figures, 2 tables, and 7 references, 3 of which are Soviet, 4 English.

69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene
Rubbers

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni
M.V. Lomonosova (Moscow Institute of Fine Chemical Technology
imeni M.V. Lomonosov). Nauchno-issledovatel'skiy institut
shinnoy promyshlennosti (Scientific Research Institute of
the Tire Industry)

SUBMITTED: July 12, 1957

AVAILABLE: Library of Congress
Card 4/4

69-20-3-2/24

AUTHORS: Dogadkin, B.A.; Tarasova, Z.N.; Kaplunov, M.Ya.; Karpov, V.L.;
Klauzen, N.A.

TITLE: The Structure and Properties of Rubbers Produced in Irradiation
Vulcanization (Struktura i svoystva rezin, poluchennykh pri
radiatsionnoy vulkanizatsii)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 260-271 (USSR)

ABSTRACT: The vulcanization of rubber products by different nuclear
radiation sources has aroused great interest in the last
years. The irradiated rubber products usually show better
mechanical and chemical properties than those vulcanized by
present methods. Rubbers of the types SKS-30A, SKI, SKB,
and natural rubber were tested. The samples were irradiated
in an atomic reactor or by a Co^{60} source with a dose of
 10^7 - 10^8 r. The investigation of the infrared absorption
spectra has shown that in the 5.8μ field a broad absorption
band corresponds to the carbonyl groups of acids, aldehydes,
and ketones. In the 2.8μ field the absorption band of
the hydroxyl groups is shown. The density of the network
formed during irradiation vulcanization is determined by
the energy dose absorbed, by the type and the composition

Card 1/3

69-20-5-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

of the rubber, carbon black and antioxidant, as well as by the irradiation conditions. The number of cross bonds per 100 eV in an air medium is, 12 in extracted butadienstirol rubber; 4 in extracted natural rubber; 2.5 in technical SKS-30A. The structurization effect is increased by an increase in temperature, and decreased in the presence of an inhibitor (phenyl- β -naphthylamin). A correlation has been found between the relative rate of chemical stress relaxation and the density of the vulcanizate network which is due to the formation of C-C bonds during irradiation. The degree of crystallization in the rubber decreases when the irradiation doses are increased. At a dose of 20-30 $\cdot 10^6$ r the crystallization is the same as in sulfur vulcanizates of similar network density. Compared with sulfur vulcanizates, the irradiation samples show an aging resistance 4-5 times higher at 130°C, a lower residual deformation, a low hysteresis, a high temperature resistance, etc. There are 12 graphs, 6 tables, and 8 references, 5 of which are Soviet and 3 English.

Card 2/3

69-20-3-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,
Moskva (Scientific Research Institute of the Tire Industry,
Moscow)

SUBMITTED: October 30, 1957

Card 3/3

1. Rubber--Vulcanization 2. Rubber--Properties 3. Rubber
--Radiation--Applications

DOGADKIN, B.A.; EYTINGON, I.I.; FEL'DSHTYIN, M.S.; ~~TARASOVA, Z.N.~~;
TUR'YANOVA, Ye.N.; LIN'YAN. TSIN'; KLAUZEN, N.A.; PEVZNER, D.M.

Vulcanization of rubber in the presence of aminomethyl derivatives
of 2-mercaptobenzothiazole as accelerators. Koll.zhur. 21 no.4:
427-435 J1-Ag '59. (MIRA 13:8)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,
Moskva. (Benzothiazole)
(Vulcanization)

SOV/69-21-4-10/22

5(4)

AUTHOR:

Dogadkin, B.A., Eytingon, I.I., Fel'dshteyn, M.S., Tarasova Z.N.,
Gur'yanova, Ye .N., Lin Yang Ch'ih, Klauzen, N.A. and Revzner,
D.M.

TITLE:

Vulcanization of Rubber in the presence of Aminomethyl Deri-
vatives of 2-Mercaptobenzothiazole

PERIODICAL:

Kolloidnyy zhurnal, 1959, Vol XXI, Nr 4, pp 427-435 (USSR)

ABSTRACT:

The authors synthesized a number of compounds, condensation products of 2-mercaptobenzothiazole and formaldehyde with various amines, to test them as accelerators of vulcanization in mixtures of synthetic and natural rubbers. According to the data of spectral analysis, the chemical structure of these 2-mercaptobenzothiazole derivatives is characterized by the presence of a -S-C-N- group. The experiments proved that aminomethyl derivatives of 2-mercaptobenzothiazole are effective accelerators of the vulcanization process. Figure 3 (graph) shows the vulcanizing activity of these derivatives in comparison with

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SOV/69-21-4-10/22

Vulcanization of Rubber in the Presence of Aminomethyl Derivatives of
2- Mercaptobenzothiazole

the effect of sulfenamide accelerators. It was further found that vulcanization of rubber mixtures with aminomethyl derivatives is characterized by higher rates in the initial period as compared with vulcanization of mixtures containing sulfenamide accelerators. In comparison with the latter, aminomethyl derivatives enter into isotopic exchange with di-2-benzothiazolil-disulfide at lower temperatures (graphs 6 and 7). Aminomethyl derivatives of 2-mercaptobenzothiazole do not exert an independent structurizing (vulcanizing) effect on rubber (table 3). In this respect they differ from the sulfenamide compounds. There are 7 graphs, 3 tables and 7 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,
Moskva (Scientific Research Institute of the Tire Industry,
Moscow)

SUBMITTED: 23 December, 1958
Card 2/2

S/138/59/000/011/002/011
A051/A029

15.9210 also 2109, 2209

AUTHORS: Tarasova, Z. N.; Fedorova, T. V.; Dogadkin, B. A.

TITLE: The Effect of the Vulcanization Temperature on the Structure and Properties of Vulcanizates Made of Butadiene-Styrene¹⁵ and Isoprene Rubbers¹⁶

PERIODICAL: Kauchuk i Rezina, 1959, No. 11, pp. 7-14.

TEXT: The temperature effect (between 133 and 200°C) on the structure of CKC-30AM (SKS-30AM), CKM (SKI) and vulcanizates was studied in order to find a way to intensify the vulcanization process and obtain rubber resistant to high temperatures. The thermal and thermo-oxidizing treatment of the butadiene-styrene rubbers at 200°C causes structuralizing. The effect of the structuralizing was evaluated by the magnitude of maximum swelling and from the physico-mechanical properties. Figure 1 indicates that the presence of admixtures in the rubbers affects the structuralizing process. The SKS-30AM rubbers, extracted with ethanol-toluene have a higher rate and degree of structuralizing. It is found that the structuralizing greatly increases with the introduction of carbon blacks into the SKS-30AM-based

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S/138/59/000/011/002/011
A051/A029

The Effect of the Vulcanization Temperature on the Structure and Properties of Vulcanizates Made of Butadiene-Styrene and Isoprene Rubbers

rubber mixtures, whereby the channel carbon black causes the greatest effect. An infrared spectral analysis of commercial and purified SKS-30AM was conducted, over a period of 6 hours, and it was seen that both vulcanizates exhibit only slight oxidation as compared to the initial rubber. The unsaturation of the rubber greatly decreased as a result of heating. The data of the infrared spectra show that the presence of the 1,4 double bonds decreases in unpurified commercial rubber from 79 to 29% and in the extracted rubber to 32% (Table 1). This is due to the formation of intra-molecular cyclic structures and to oxidation, and not to the polymerization processes taking place, since the number of formed transverse bonds corresponds to the loss of no more than 2% of the double bonds, if it is considered that the process takes place completely along these bonds. Further studies were made on vulcanizates from SKS-30AM rubber, obtained with various accelerators, as to the effect of temperatures within the range of 133-173°C on the structure and properties of these vulcanizates. It was seen that in the vulcanization of non-filled mixtures from SKS-30AM and SKI with sulphenamide accelerators a clearly expressed reversion takes place which is

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S/138/59/000/011/002/011
A051/A029

The Effect of the Vulcanization Temperature on the Structure and Properties
of Vulcanizates Made of Butadiene-Styrene and Isoprene Rubbers

intensified with an increase in the vulcanization temperature. This reversion depends mostly on the destruction of the transverse sulfur bonds under the effect of the amines forming due to the decomposition of the accelerators and also on the acceleration of the thermooxidizing processes under the effect of the forming mercaptanes. A decrease of the reversion and an improvement of properties of SKS-3OAM and SKI is observed with an increase in the vulcanization temperature if sulphenamide accelerators are used, applying the vulcanization system containing NN-diethyl-2 benzothiazole sulphenamide and tetramethylthiurammonosulfide. There are 3 tables, 7 sets of graphs and 8 references: 6 Soviet, 2 English. ✓

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti
(Scientific Research Institute of the Tire Industry)

Card 3/3

TARASOVA, Z.

Latvian (G.D.)

PHASE I BOOK EXPLOITATION SOV/5410

Tashkentskaya konferentsiya po mirnomu ispol'zovaniyu atomnoy energii. Tashkent, 1959.

Trudy (Transactions of the Tashkent Conference on the Peaceful Uses of Atomic Energy) v. 2. Tashkent, Izd-vo AN UzSSR, 1960. 449 p. Errata slip inserted. 1,500 copies printed.

Sponsoring Agency: Akademiya nauk Uzbekskoy SSR.

Responsible Ed.: S. V. Starodubtsev, Academician, Academy of Sciences Uzbek SSR. Editorial Board: A. A. Abdullayev, Candidate of Physics and Mathematics; D. M. Abdurizulov, Doctor of Medical Sciences; U. A. Arifov, Academician, Academy of Sciences Uzbek SSR; A. A. Borodulina, Candidate of Biological Sciences; V. N. Ivashev; G. S. Ikramova; A. Ye. Kiv; Ye. M. Ischanov, Candidate of Physics and Mathematics; A. I. Nikolayev, Candidate of Medical Sciences; D. Nishanov, Candidate of Chemical Sciences; A. S. Sadykov, Corresponding Member, Academy of Sciences USSR, Academician, Academy of Sciences Uzbek SSR; Yu. N. Talanin,

Card ~~1/20~~

170

Transactions of the Tashkent (Cont.)

SOV/5410

Candidate of Physics and Mathematics; Ya. Kh. Turakulov, Doctor of Biological Sciences. Ed.: R. I. Khamidov; Tech. Ed.: A. G. Babakhanova.

PURPOSE: The publication is intended for scientific workers and specialists employed in enterprises where radioactive isotopes and nuclear radiation are used for research in chemical, geological, and technological fields.

COVERAGE: This collection of 133 articles represents the second volume of the Transactions of the Tashkent Conference on the Peaceful Uses of Atomic Energy. The individual articles deal with a wide range of problems in the field of nuclear radiation, including: production and chemical analysis of radioactive isotopes; investigation of the kinetics of chemical reactions by means of isotopes; application of spectral analysis for the manufacturing of radioactive preparations; radioactive methods for determining the content of elements in the rocks; and an analysis of methods for obtaining pure substances. Certain

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Transactions of the Tashkent (Cont.)

SOV/5410

instruments used, such as automatic regulators, flowmeters, level gauges, and high-sensitivity gamma-relays, are described. No personalities are mentioned. References follow individual articles.

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IN ENGINEERING AND GEOLOGY

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7

Taksar, I. M., and V. A. Yanushkovskiy [Institut fiziki AN Latv SSR - Institute of Physics AS Latvian SSR]. Problems of the Typification of Automatic-Control Apparatus Based on the Use of Radioactive Isotopes

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 - Borukhov, M. Yu., and A. T. Lebedev [Institute of Nuclear Physics AS UzSSR]. A Unified Radioactive Isodromic Regulator (URIR) 29
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 - Snisarenko, A., Z. Tarasova, Ye. Nepomnyashchii, and V. Novopol'skiy [Nauchno-issledovatel'skiy institut shinnoy promyshlennosti-Scientific Research Institute of the Tire Industry]. Determination of the Wear of Car Tires by Means of Isotopes TL²⁰⁴ 43
 - Arkhangel'skiy, A. A., and G. D. Latyshev [Institute of Nuclear
- Card 5/20

15.9202

11.2211

31979
S/081/61,000/023/056/061
B106/B101

AUTHORS: Tarasova, Z., Kaplunov, M., Vas'kovskaya, M., Dogadkin, B.

TITLE: Vulcanization structures and their effect on fatigue

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1961, 560 - 561,
abstract 23P351. (Sb. "Vulkanizatsiya rezin. izdeliy",
Yaroslavl', 1960, 25 - 42)

TEXT: Vulcanizates of Hk(NK), butadiene styrene, and Na butadiene rubber with the accelerators Thiuram, diphenyl guanidine, captax, altax, and radiation vulcanizates of these rubbers have been examined to determine the type of cross linking. The latter was determined by isotopic exchange with sulfur, vulcanizing accelerators, vulcanizates containing radioactive sulfur, and by the method of determining the rate constant of relaxation of tension at constant deformation (Dogadkin, Tarasova, Kolloid. zhurnal, v. 15, no. 5, 1953, 347). The factors determining the exchangeability are the nature of the rubber and the composition of the vulcanizing group. The poorer the exchangeability, the higher the thermomechanical stability. The exchangeability of sulfur compounds decreases with increasing

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31979

S/081/61/000/023/056/061

B106/B101

Vulcanization structures and their...

temperature and duration of vulcanization. The relative rate of exchange is higher at the beginning of vulcanization than later on. The number of exchangeable bonds passes through a maximum which corresponds to an optimum of vulcanization. The vulcanization temperature has different effects on the structure of the vulcanizate, which depend on the nature of rubber and the accelerators. Samples of CAC-30 (SKS-30), NK, and CKB (SKB) rubber containing Thiuram, diphenyl guanidine, captax, and hexachlorane were subjected to fatigue tests by symmetrically alternating load. The fatigue resistance of vulcanizates rises with increasing energy of cross links. The variation in density of the vulcanization network of samples subjected to fatigue tests is determined by the nature of rubber and of the system of vulcanization, and depends on the direction of the regrouping processes of the radicals which are formed when the polymer chains and the bridge bonds break up. Fatigue at low temperatures (20 - 40°C) increases the exchangeability of vulcanizates, whereas it is reduced by fatigue at 100°C and higher temperatures. The fatigue resistance of rubber can be increased by adding acceptors for free radicals (disulfide p-tert-butyl phenol, hexachloroethane). [Abstractor's note: Complete translation.]

Card 2/2

S/138/60/000/003/007/007
A051/A029

AUTHORS: Tarasova, Z.N.; Priss, L.S.; Smirnova, L.A.

TITLE: The VII Scientific Conference for High-Molecular Compounds ^{III}

PERIODICAL: Kauchuk i Rezina, 1960, No. 3. p. 54

TEXT: The VII nauchnaya konferentsiya po vysokomolekulyarnym soyedineniyam (VII Scientific Conference on High-Molecular Compounds) took place on February 8 - 13, 1960, in Leningrad. It was organized by the Institut vysokomolekulyarnykh soyedineniy (Institute of High-Molecular Compounds) (IVS) of the AS of the USSR. There were 57 papers presented on the following subjects: the mechanism of polymerization and destruction, stereo-regular polymers, the synthesis of polymers, the mechanical properties of polymers, solutions of polymers, cellulose and its derivatives, the relaxation properties and structure of polymers, biopolymers. A paper on the investigation of molecular weight distribution of polycondensation products was presented by S.E. Bresler, Yu.Ya. Gotlib and S.Ya. Frenkel. Macroradicals were also investigated by these authors. A number of papers was dedicated to the subject of the effect of orientation and molecular weight on the strength and creeping of various polymers in the vitrified state. ✓

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S/138/60/000/003/007/007
A051/A029

The VII Scientific Conference for High-Molecular Compounds

Ye.V. Kuvshinskiy and M.Ye. Bessonov submitted a paper on the features of "silver cracks" in polymethylmethacrylate. The study of polymers by the method of dielectric loss was discussed in the paper by G.P. Mikhaylov and co-workers. An interesting method for determining the mobility of the chains of polymer molecules in a block was suggested by Ye.V. Anufriyeva. Over 600 specialists from more than 50 institutes took part in the conference. ✓

Card 2/2

15.9120

2209, 1403, 1138 only

86295

S/190/60/002/008/007/017
B004/B054

AUTHORS:

Tarasova, Z. N., Kaplunov, M. Ya., Kozlov, V. T.,
Klauzen, N. A., Dogadkin, B. A.

TITLE:

Interaction of Sulfur With Natural Rubber Under the Action
of Ionizing Radiation

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 8,
pp. 1201-1206

TEXT: The authors study the problem of production of radiation-resisting rubbers, the conditions for a common vulcanization of irradiated and sulfurated rubbers, and the modification of rubbers treated with radiation. The present paper gives the first informative results of investigation of the effect of radiation by Co^{60} on rubber in the presence of sulfur. A considerable sulfur addition occurred at 25°C , and was accelerated by an increase in the radiation dose and temperature, particularly by addition of hexane chloro ethane. In thermal vulcanization, the admixture of chloro derivatives showed no effect on sulfur addition. The presence of sulfur delays the structuration as compared with rubber without sulfur admixture.

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86295

Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017
the Action of Ionizing Radiation B004/B054

But structuration increases also here between -80°C and $+100^{\circ}\text{C}$ with increasing temperature. Pure rubber showed at 50°C a reversion of the structuration process, which was not observed in the presence of sulfur in the temperature range investigated. A study of the infrared spectra in argon of irradiated rubbers with and without sulfur showed a decrease in intensity of the 840 cm^{-1} band due to a reduced degree of nonsaturation. This effect was more intense in the presence of sulfur. The decrease in intensity of the 2940 and 1450 cm^{-1} bands due to a reduced number of CH_2 groups or ring

formation was, however, more intense in the presence of sulfur. An investigation of the sulfur exchange at 120°C in irradiated rubber tagged with radioactive sulfur, carried out by a method described in Ref. 7, showed that about 40% of sulfur is exchangeable. This amount does not depend on the radiation dose (up to 100 megareöntgens). The high degree of exchangeability is ascribed to a formation of polysulfide groups. Sulfurous rubbers with addition of hexachloro ethane showed, on irradiation with 20 megareöntgens, maximum values of tensile strength (about 130 kg/cm^2) and of elongation. When irradiating pure rubber, a maximum (about 100 kg/cm^2) is only attained at 50-70 megareöntgens. Sulfurous irradiated vulcanizates showed a faster stress relaxation than irradiated vulcanizates free from

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Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017
the Action of Ionizing Radiation B004/B054

sulfur. The authors assume that sulfur addition leads to a more homogeneous and regular structure since secondary reactions causing chain ramification are inhibited. There are 7 figures and 7 references: 3 Soviet, 3 US, and 1 British.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti
(Scientific Research Institute of the Tire Industry)

SUBMITTED: March 24, 1960

Card 3/3

TARASOVA, Z.N.; PRISS, L.S.; SMIRNOVA, L.A.

Seventh scientific conference on high molecular weight compounds. *Kauch. i rez.* 19 no.3:54 M '60. (MIRA 13:6)
(Macromolecular compounds--Congresses)

69468

S/069/60/022/02/021/024
D034/D002

5+
15.9120

AUTHOR:

Tarasova, Z.N., Dogadkin, B.A., Arkhangel'skaya, M.I.
Petrova S.B.

TITLE:

The Structure and Properties of Vulcanizates of
Carboxylated Rubber Produced by the Combined Action
of Metal Oxides and High Energy Radiation

PERIODICAL:

Kolloidnyy zhurnal, 1960, Vol XXII, Nr 2, pp 253-256
(USSR)

ABSTRACT:

On the basis of a number of investigations the authors
of the article discuss the effect of the structure
of vulcanizates of carboxylated rubber on their
strength properties. It could be established that
the rate constant of stress relaxation of these
vulcanizates at 150°C is about 50-100 fold that of
the vulcanizates with polysulfide bonds [Ref. 1].
Investigation of the change of osmotic and viscosi-

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69468

S/069/60/022/02/021/024
D034/D002

The Structure and Properties of Vulcanizates of Carboxylated Rubber
Produced by the Combined Action of Metal Oxides and High Energy
Radiation

metric properties of rubber mixture and vulcanizate solutions prior to and after relaxation showed that the molecular weight does not considerably change. This in connection with the observed preservation of the number of cross links during relaxation suggests the conclusion that the weakening of the stress during the relaxation of carboxylated rubber vulcanizates with salt type cross bonds is due to the disintegration of the latter and the rising of new bonds as a result of exchange reactions. The low thermal stability of salt type bonds requires additional introduction of stable bonds into the vulcanization network. Good results were obtained with Co-60 treatment of carboxylated rubber preliminarily vulcanized

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69468

S/069/60/022/02/021/024

D034/D002

The Structure and Properties of Vulcanizates of Carboxylated Rubber
Produced by the Combined Action of Metal Oxides and High Energy
Radiation

with metal oxides. The formation of a limited number
of cross bonds-C-C- (approximately 1 per 1000 mono-
mer units) permits preparing vulcanizates of high
thermal stability and strength. The strength of such
vulcanizates exceeds 400 kg/cm². There are 1 graph,
1 table and 4 references, 3 of which are Soviet
and 1 English.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promysh-
lennosti, Moskva (Scientific Research Institute of
the Tire Industry, Moscow)

SUBMITTED: November 9, 1959

Card 3/3

1.2211
5.9300
AUTHORS:

34896
S/081/62/000/003/085/09
B 162/B101
Dogadkin, B. A., Tarasova, Z. N., Kaplunov, M. Ya., Breger,
A. Kh., Kopersha, L. M., Vaynshteyn, B. I., Vizel', Ya. M.,
Karpov, V. L.

TITLE:

Intensification of the process of radiation vulcanization
and technical principles of an experimental installation for
radiation vulcanisation of tyres
PERIODICAL: Referativnyy zhurnal. Khimiya, no. 3, 1962, 595 - 596,
abstract 3P275 (Sb. "Radioakt. izotopy i yadern. izlucheniya
v nar. kh-ve SSSR, v. I", M., Gostoptekhnizdat, 1961, 184 - 196)

TEXT: An investigation was made into the effect of medium (air and vacuum),
temperature (from -196 to 100°C), sensitizers and inhibitors on radiation
vulcanization under the action of ^{60}Co γ - radiation of butadiene,
butadiene-styrene and natural rubber. The degree of cross-linking in air
is higher than in vacuum. In the presence of 2% phenyl - β - naphthyl-
amine the radiation-chemical yield of cross-links per 100 ev of absorbed

FOR RELEASE: 07/13/2001
Car 1/3

Intensification of the process ...

S/081/62/000/003/085/090
B162/B101

energy drops by half for butadiene rubber in vacuum. The decrease in non-saturation is only partially explained by cross-linking and oxidation, and in the main this phenomenon is probably connected with the formation of intra-molecular rings. The cross-linking at different temperatures depends to a large extent on the structure of the rubber. Aliphatic polyhalides reduce the required radiation dose by half (to 25 Mr) and ensure the production of rubbers with a static strength equal to the strength of the best sulphur vulcanized rubbers. Vulcanization of rubbers containing carboxyl by the combined action of metal oxides and nuclear radiation (dose 10 Mr) gives vulcanized rubbers with high thermal stability and high strength properties. An investigation was made into the kinetics of the addition of styrene and 2,5 -dichlorostyrene to natural rubber and butadiene-styrene rubber and to mixtures of these with channel black with irradiation in Ar. An acceleration of vulcanization was observed in the presence of these monomers and vulcanized rubbers were obtained which possessed high thermomechanical stability and strength. The technical principles of a technological process for an experimental installation for radiation vulcanization of tyres are examined. Different types of γ -radiation sources were compared: radiation In-Ga loop of a nuclear reactor,

Card 2/3

28800

15 9130

S/138/61/000/009/004/011
A051/A129

AUTHORS: Tarasova, Z. N., Eytingon, I. I., Senatorskaya, L. G., Fedorova, T. V.,
Dogadkin, B. A.

TITLE: Application of phenothiazine (thiodiphenylamine) as an antifatigue
agent of NR, CKI (SKI) and CKC-30AM (SKS-30AM) vulcanizates

PERIODICAL: Kauchuk i rezina, no. 9, 1961, 15 - 18

TEXT: A study was carried out to determine the action of phenothiazine during the vulcanization and fatigue of NR, SKI and SKS-30AM rubbers. It was established that phenothiazine has no significant effect on the kinetics of vulcanization and on the standard physico-mechanical properties of the vulcanizates. It increases the durability of the vulcanizates from the given rubbers during the process of repeated deformations under various conditions of fatigue. Phenothiazine or the products of its transformation combine with the vulcanizate under the effect of thermo-oxidizing action and repeated deformations. No combining of phenothiazine was noted during the process of thermal action alone. Phenothiazine in conjunction with certain oxidation inhibitors has more than just an additive action (mutually-intensifying action). A study of the exchange ability of the

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X

28800

S/138/61/000/009/004/011
A051/A129

Application of phenothiazine...

vulcanizates with elemental sulfur showed that phenothiazine does not affect the nature of the vulcanizing structures, and during vulcanization at 143°C causes noticeable changes in the type of the sulfur bonds at temperatures of 173°C. A further study of its ability to react in isotope exchange with elemental sulfur showed that under vulcanization at 173°C there is no noticeable sulfur exchange in phenothiazine. Data of Table 1 reveal that phenothiazine reduces the rate of chemical relaxation by 3 to 7 times in NR vulcanizates and by a factor of two in vulcanizates of SKI, and by 2 - 3 times in SKS-30A vulcanizates. It has a more effective action in rubbers produced at elevated vulcanizing temperatures than other known anti-fatigue agents, such as N-phenyl-N'-cyclohexyl-n-phenylenediamine (4010). Phenothiazine increases the durability of the vulcanizates during the process of repeated deformations in symmetrical sign-changing loading and in repeated bending. It reacts with the products of oxidation, stabilizing the latter and thus preventing the further development of the thermo-oxidizing destruction. The application of a system of inhibitors having a combined intensifying action shows promise in extending the service life of rubbers and stabilizing them. There are 2 tables, 1 set of graphs and 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows:

Card 2/4

S/081/62/000/003/085/090
B162/B101

Intensification of the process ...

energy drops by half for butadiene rubber in vacuum. The decrease in non-saturation is only partially explained by cross-linking and oxidation, and in the main this phenomenon is probably connected with the formation of intra-molecular rings. The cross-linking at different temperatures depends to a large extent on the structure of the rubber. Aliphatic polyhalides reduce the required radiation dose by half (to 25 Mr) and ensure the production of rubbers with a static strength equal to the strength of the best sulphur vulcanized rubbers. Vulcanization of rubbers containing carboxyl by the combined action of metal oxides and nuclear radiation (dose 10 Mr) gives vulcanized rubbers with high thermal stability and high strength properties. An investigation was made into the kinetics of the addition of styrene and 2,5 -dichlorostyrene to natural rubber and butadiene-styrene rubber and to mixtures of these with channel black with irradiation in Ar. An acceleration of vulcanization was observed in the presence of these monomers and vulcanized rubbers were obtained which possessed high thermomechanical stability and strength. The technical principles of a technological process for an experimental installation for radiation vulcanization of tyres are examined. Different types of γ -radiation sources were compared: radiation In-Ga loop of a nuclear reactor,

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Intensification of the process ...

S/081/62/000/003/085/090
B162/B101

spent-fuel assemblies, Co⁶⁰ and different types of irradiators. A scheme is proposed for a technological process for an experimental installation with spent-fuel assemblies. [Abstracter's note: Complete translation]

Card 3/3

28800

S/138/61/000/009/004/011

A051/A129

Application of phenothiazine...

Murphy, Ravner, Smith, Ind. Eng. Chem., 42, no. 2, 2479 (1950); A. Tobolsky, J. Appl. Phys., 27, no. 7, 673 (1956).

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of the Tire Industry)

Table 1. Effect of the type of the anti-fatigue agent introduced into the mixture on the rate of chemical relaxation of tension and the durability of the vulcanizates during the fatigue process (dosage of anti-fatigue agent 1.0 w.p. to 100 w.p. of rubber)

Type of rubber	Type of anti-fatigue agent	Vulcanization conditions		Rate of relaxation constant at 130°C, min ⁻¹ · 10 ⁻³		Durability in deformations, 1,000 cycl	
		temp., °C	duration, min	in air	in non-oxygen conditions	symmetr. loading at 100°C	repeated bending pinning at 20°C
NR	without anti-fatigue agent	143	20	38.0	1.11	1,934	-
	phenothiazine	143	20	11.5	1.57	3,217	-

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S/138/61/000/009/004/011
A051/A129

Application of phenothiazine...

Table 1. (continued)

N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	143	20	7.4	-	5.489	-
without anti-fatigue agent	173	5	-	-	-	292
phenothiazine	173	5	6.1	-	-	600
N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	173	5	12.7	-	-	405
SKS-30 without anti-fatigue agent	143	20	42.3	-	6.746	-
phenothiazine	143	20	13.8	-	8.390	-
N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	143	20	19.9	-	-	-
SKI-3 without anti-fatigue agent (rubber stabilized with 0.5% neozone D and 0.5% 1,4-diphenyl-n-phenylenediamine)	138	40	20.5	-	-	85
phenothiazine	138	40	11.2	-	-	145

Card 4/4

TARASOVA, Z. N.; KAPLUNOV, M. Ia.; KOZLOV, T. V.; KLAUZEN, N. A.; DOGADKIN, B.A.

Interaction of sulphur and natural rubber under ionizing radiation.
Chem prum 11 no.11:601-604 N '61.

1. Vyzkumnyy ustav prumyslu pneumatik, Moskva.

L 40564-65 EWG(j)/EWT(m)/EWF(j)/EWA(h)/EWA(1) Pc-4/Feb GS/RM
 S/0000/64/000/000/0088/0094

ACCESSION NR: AT5004098

20
B+1

AUTHOR: Snisarenko, A.M.; Tarasova, Z.N.

TITLE: A study of physico-chemical changes in structure during wear of vulcanized rubber

SOURCE: Nauchno-tekhnicheskoye soveshchaniye po friktsionnomu iznosu rezin. Moscow, 1961. Friktionnyy iznos rezin (Frictional wear of rubber); sbornik statey. Moscow, Izd-vo Khimiya, 1964, 88-94

TOPIC TAGS: natural rubber, vulcanized rubber, rubber wear, rubber structure, frictional wear, vulcanization kinetics, mercaptobenzthiazole, radiation vulcanization, rubber abrasion

ABSTRACT: Experimental methods and a mathematical model were developed which permit the evaluation of the physical and chemical properties of rubber vulcanizates during abrasive wear. The kinetics of the sulfur-natural rubber reaction were studied at 100-130C with sulfur-35 and in the presence or absence of 2-mercaptobenzthiazole. Sulfur-35 was used to study the radiation-vulcanized/unfilled natural rubber.

The latter was against
150-abrasive paper or against corrugated rigid polyvinyl chloride
Card 1/2

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ACCESSION NR: AT5004098

of abraded particles was measured in Dogadkin's apparatus to evaluate changes in crosslinking, and radiation measurements indicated the bonding of sulfur and the cleavage of mono- and polysulfide bonds during abrasion. A mathematical model was developed correlating the bonding of sulfur and change in rate constants with temperature. The experimental results indicated that the increase in temperature of the contact zone and abraded layer is markedly higher than assumed by earlier theories and little affected by the normal load during wear. The reaction period is on the order of a few seconds, confirming assumptions of fatigue effects in the abrasive wear of vulcanized rubber. The applied load affects wear by the penetration of abrasive particles into the rubber. Differences in the calculated period of chemical processes on different abrasive surfaces are ascribed to the difference in temperatures reached and to the effects of surface properties. Orig. art. has: 2 figures, 3 tables and 7 formulas.

ASSOCIATION: none

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AUTHORS: Dogadkin, B. A., Tarasova, Z. N., Fogel'son, M. S., and Kashlinskiy, A. I.

TITLE: Interaction of sulfur with rubber under the action of γ - radiation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 1, 1961, 90 - 93

TEXT: The authors studied the interaction of natural-rubber-sulfur (NR + S) mixtures under the action of γ - radiation (dose 6 - 11 Mr) at +20 and -196°C by means of electron paramagnetic resonance (epr). They used a spectrometer with high-frequency modulation at -140 - +20°C. Highly stable radicals were formed by irradiating NR and its mixtures with 2% S; their spectra were equal, their concentration was $(1 - 2.5) \cdot 10^{14} \text{ mg}^{-1}$, and after 30 - 45 days it was still $(0.05 - 0.1) \cdot 10^{14} \text{ mg}^{-1}$. Besides free alkyl radicals formed during irradiation of NR due to the disruption of an H atom and the rupture of

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the -C-C bonds of the NR chains, radicals of the allyl type are also formed. They are stabilized by the effect of conjugation of the free valency with the adjacent double bond and are assumed to be long-lived polymer radicals. When irradiated at -196°C , the NR spectrum differs from that of the S + NR mixture. Since each spectrum constitutes a superposition of lines, the existence of several radical types is assumed. The inhibitory effect of sulfur may be ascribed, as in benzene, to the delocalization of an electron in the eight-membered ring of the sulfur molecule. When the samples irradiated at -196°C are heated at room temperature for 1 - 1.5 min, their spectrum becomes equal to that of long-lived radicals formed by irradiation of the same samples at $+20^{\circ}\text{C}$. Thus, radicals of varying stability are formed by irradiation at -196°C . The short-lived among them live for a few seconds at room temperature. The concentration dropped by gradual heating of the samples (at intervals of $6-7^{\circ}\text{C}$) from -196 to $+20^{\circ}\text{C}$ in liquid-nitrogen vapor, and keeping the sample at given temperature for 5 min, as well as cooling to -140°C . On

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heating from -196 to -120°C the spectrum was not changed. The range of intense destruction of radicals corresponds to the vitrification range of NR (between -80 and -50°C). The reactivity rapidly increases in the range of the mobility jump of individual links of the molecular chain. Here (as on heating of irradiated NR) only the initial short-lived radicals perish whereas in the S + NR mixture new short-lived radicals with a high g-factor are also formed. This is explained in two ways: (A) At least two new radicals are formed in the mixture, or (B) only one radical with an anisotropic g-factor containing an -S-S group is formed. Since the concentration of newly formed radicals is a function of heating with a maximum at -80°C , it is concluded that at this temperature the ratio of the rate of formation to the rate of destruction of the new radicals is most favorable, effecting a maximum of recordable concentration. For the most distinct additional line characterizing the newly formed radicals, the g-factor is 2.027 ± 0.003 . Its value is equal to the one exhibited by sulfur radicals in the melt at 200°C . It is concluded that the new radicals are due to interaction of S_8 molecules with polymer radicals R^{\bullet} of

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NR under the action of γ -rays. Below vitrification temperature, this interaction does not take place. It is based on the rupture of the eight-membered sulfur ring, and can only take place at temperatures permitting the required mobility of NR molecular chains: $R^\cdot + S_8 \rightarrow RS_8^\cdot$ (1). RS_8^\cdot

may further decompose with separation of sulfur radicals:

$RS_8^\cdot \rightarrow RS_{(8-x)}^\cdot + S_x^{\cdot\cdot}$ (2). Thus, S radicals are formed due to interaction of polymer radicals with S molecules at temperatures below 0°C . The radicals $RS_{(8-x)}^\cdot$ live longer than polymeric R^\cdot radicals whereas $S_x^{\cdot\cdot}$

radicals are more active. The steric structure of rubber is a consequence of the interaction of R^\cdot with each other and with rubber molecules. The structure is formed in a temperature range in which, according to the epr, the radicals disappear most quickly when the irradiated NR thaws. S inhibits the formation of polymer radicals during irradiation. The S-containing radicals can be stabilized by formation of cyclic end groups. Also this process reduces the cross links. An interaction of $S_x^{\cdot\cdot}$ biradicals with molecular chains is possible; nevertheless, intramolecular

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cyclic structures may form which do not increase the number of double bonds. Data of isotopic exchange show that polysulfide linear structures $S_x (x \geq 1)$ occur in the vulcanizates. These structures increase the static strength of radiation vulcanizates. There are 4 figures and 3 references: 2 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: D. Gardner, G. Fraenkel, J. Am. Chem. Soc., 78, 3279 (1956).

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology imen: M. V. Lomonosov)

PRESENTED: June 14, 1961, by A. A. Balandin, Academician

SUBMITTED: June 8, 1961

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TARASOVA, Z. N.
USSR

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DOJADKIN, B. A., and TARASOVA, Z. N., Moscow
Institute of Fine Chemical Technology named
A. V. Leontovskiy [1961 position] - "Influence
of vulcanisation structures on physical and
mechanical properties of vulcanisates"
(Session II)

KUZYMINSKIY, A. S., LYUECHANSEKAYA, L. I.,
VELICHKIN, L. S., Scientific Research Institute
of Rubber Industry, Moscow [1960 location] -
"Influence of mechanical stresses on the aging
of vulcanisates" (Session II)

BOGOMOLOV, A. A., and KUZNETSOV, V. M.,
Moscow [1961 position] - "Influence of
mechanical stresses on the aging of vulcanisates"
(Session II)

BOGOMOLOV, A. A., Scientific Research Institute
of Rubber Industry, Moscow [1961 position] -
"Influence of aging vulcanisation of
"KINOL" fluorocopolymer" (Session II)

MEZHNEVSKIY, M. K., and KROTSKIY, G. I.,
Scientific Research Institute of Tire Industry,
Moscow - "Special features of the mechanism of
abrasion of high-elastic materials" (Session V)

Report to be submitted for the 4th Rubber Technology Conference,
London, England, 22-25 May 1962.

S/844/62/000/000/095/129
D204/D307

AUTHORS: Dogadkin, B. A., ~~Tarazova, Z. N.~~, Kaplunov, M. Ya., Kozlov, V. T., Klauzen, I. A. and Matveyev, V. S.

TITLE: The interactions of sulfur with polymers under the action or irradiation

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khimii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962, 554-562

TEXT: The interactions of S with natural rubber, 1,4-cis-polybutadiene, butadiene-styrene and butyl rubber was studied, under irradiation from a Co^{60} source. S added on to natural rubber at 25 - 100°C and to butadiene-styrene rubber and polyethylene at 250°C, under argon, in amounts increasing with the dose (0 - 120 Mr), the rate of addition being faster at higher temperatures. At room temperature the amount of S added on is independent of the initial S-content in the starting mixture (1 - 10% by weight). The addition

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